REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1 and 3-5 are pending in the present application. Claim 2 is canceled without prejudice or disclaimer, and Claim 1 is amended by the present amendment without an introduction of any new matter.

In the outstanding Office Action, Claims 1-5 were rejected under 35 U.S.C. § 103(a) as unpatentable over Friday et al. (U.S. Patent 6,183,627, herein "Friday"); and Claims 1-5 were rejected under 35 U.S.C. § 103(a) as unpatentable over Boyer (U.S. Patent 4,332,671).

Applicants respectfully traverse the rejection of Claims 1-5 under 35 U.S.C. § 103(a) as unpatentable over Friday, and the rejection of Claims 1-5 under 35 U.S.C. § 103(a) as unpatentable over Boyer as discussed next.

With respect to Friday, as acknowledged in the Office Action, Friday fails to disclose or suggest "... a step of thermally cracking the heavy oil content obtained directly from a bottom of the distilling section into a lightened thermally cracked product" (see page 3, last paragraph, of the Office Action). The Office Action then states that "[I]t would have been obvious to one having ordinary skill in the art ... to eliminate the solvent deasphalting step of Friday ... because the elimination of a step along with its function has been held to be prima facie obvious" (see page 4, first paragraph, of the Office Action).

However, Applicants respectfully submit that one skilled in the art would not have been ***motivated*** to eliminate the solvent deasphalting from the Friday's process for the following reasons.

For example, a brief review of Friday reveals that one of the purposes of the Friday's process is to produce a substantially asphaltene-free, and metal-free distillate stream from a

heavy hydrocarbon feed stream ***by solvent deasphalting*** the feed (see column 2, line 66 to column 3, line 3). Accordingly, the solvent deasphalting is ***necessary*** in the Friday's process to realize a production of a substantially asphaltene-free, and metal-free distillate stream from a heavy hydrocarbon feed stream.

Further, if a modification to eliminate the solvent deasphalting is attempted, such modification would render the Friday's process unsatisfactory for its intended purpose of producing a substantially asphaltene-free, and metal-free distillate stream from a heavy hydrocarbon feed stream. More specifically, such modification would, in effect, render the Friday's process unable to produce a substantially asphaltene-free, and metal-free distillate stream from a heavy hydrocarbon feed stream since the step of solvent deasphalting, which is ***necessary*** to achieve such production, is eliminated from the process.

Accordingly, there is no evidence that one skilled in the art would be ***motivated*** to perform such modification to the Friday's process. Note that M.P.E.P. 2143.01 states "[i]f a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

Moreover, Applicants respectfully submit that a solvent deasphalting is ***essential*** in the Friday's process, and that a heavy oil content is ***absolutely*** contained in a thermal cracking residue of the Friday's process for the following reasons.

For example, Applicants note that a deasphalted oil (DAO) obtained from residual oils contains large aromatic molecules even in non-asphaltene oil of a malten, while these are a bit smaller than asphaltene molecules. When thermally cracking the deasphalted oil, a part of such aromatic molecules in the DAO is condensed and agglomerated into much larger aromatic molecules including asphaltenes, which should be suspended as a liquid state in

thermally cracked oil. As such large molecules agglomerated are still a liquid state and non-distillable material, these are accumulated and finally precipitated like coke inside the system ***unless the solvent deasphalting step is incorporated***. Further, the solvent deasphalting separates the agglomerated asphaltene molecules from the system and produces the asphaltene stream as a residue, which is cutback and diluted with distillate oils to produce heavy fuel oil, e.g., No. 6 bunker fuel oil. Therefore, the residue from the Friday's process contains heavy oil content.

On the contrary, the method of Claim 1 includes a direct charge of heavy oil content from a bottom of crude distillation section without a solvent deasphalting, and no heavy oil content is contained in a thermal cracking residue.

Further, the method of Claim 1 is different from Friday ***in the subject matter being cracked in a thermal cracking section***. That is, a heavy oil content drawn from the bottom of the distillation section is led to a thermal cracking section ***directly, without incorporating a deasphalting treatment and without mixing a hydrogen donor stream***, and in the thermal cracking section, a lightened thermally cracked product and residues of pitch or coke are separated from each other, and the residues are drawn out from a treating process. It is noted that ***no heavy oil content is contained in the residues of pitch or coke*** drawn out from a treating process.

On the contrary, in Friday, non-distillated fraction 18 (or heavy fraction) drawn from the bottom of distillation column 14 is ***not*** led to a thermal cracker 24 ***directly, but led to an solvent deasphalting (SDA) unit 19***. The solvent deasphalting (SDA) unit 19 operates so as to separate non-distillated fraction 18 into an asphaltene stream 21 and a deasphaltene oil stream 20. The asphaltene stream 21 is drawn out from a treating process in a liquid state, which is different from residues of pitch or coke.

Further, all of materials thermally cracked in the thermal cracker 24, which are operated in a liquid state, are returned to the distillation column 14 as feedback thermally cracked stream 25 ***without drawing any materials from the cracker 24***. On the contrary, "lightened thermally cracked product" of Claim 1 is formed by thermally cracking the heavy oil content obtained substantially from a bottom of the distilling section and ***by drawing out, e.g., removing, the pitch or coke*** out of the thermal cracking section as shown, for example, in Figure 1.

Finally, in considering a feedback system starting from the bottom of the distilling section and returning to the distilling section via thermal cracker, Friday removes ***asphaltenes*** during this circular step. On the contrary, the method of Claim 1 draws out, e.g., removes, pitch or coke during this circular step.

With respect to Boyer, as acknowledged in the Office Action, Boyer fails to disclose or suggest "... said distillate oil is collectively introduced into a hydrotreating section without separating into each content having prescribed boiling range and is collectively subjected to desulfurization, cracking and hydrogenation treatment" (see page 5, second paragraph, of the Office Action). The Office Action then states that "[I]t would have been obvious to one having ordinary skill in the art ... to have modified the process of Boyer by collectively introducing the distillate oil into the hydrotreater without separating the oil into each content having a prescribed boiling range because all fractions in the Boyer process are sent to the same hydrotreater" (see page 5, last paragraph, of the Office Action).

However, Applicants respectfully submit that one skilled in the art would not have been ***motivated*** to perform such modification to the Boyer's process for the following reasons.

Initially, as stated at page 10, line 26 to page 11, line 3 of the specification of the present application, one of the benefits derived from having a distillate oil collectively introduced into a hydrotreating section without separating into each content having prescribed boiling range is that large-scale atmospheric distillation apparatuses become unnecessary.

Turning to Boyer, Boyer discloses that a feedstock is fed to an atmospheric pressure crude distillation unit 12 through a line 10, and naphtha, distillate and gas oil products are ***separately*** drawn from the atmospheric distillation unit 12 through lines 22, 24 and 26, respectively (see the Figure, and column 2, lines 30-48). That is, the naphtha, distillate and gas oil products are ***separated*** into each content. Then, the naphtha, distillate and gas oil products are ***separately*** fed to a desulfurization unit 28, from which low-sulfur naphtha, distillate and gas oil are drawn ***separately*** through lines 30, 32, and 34, respectively. In summary, the naphtha, distillate and gas oil products drawn from the atmospheric distillation unit 12 are desulfurized ***separately*** in the desulfurization unit 28 and drawn as the low-sulfur naphtha, distillate and gas oil from the desulfurization unit 28 ***separately***.

However, there is absolutely no evidence of suggestions of collectively introducing naphtha, distillate and gas oil products into the desulfurization unit without separating into each content having prescribed boiling range. More specifically, Boyer does not even address any benefits of collectively introducing naphtha, distillate and gas oil products into the desulfurization unit without separating into each content having prescribed boiling range as compared to simply introducing naphtha, distillate and gas oil products ***separately*** into the desulfurization unit.

Further, it is unclear whether the atmospheric distillation unit 12 of Boyer would actually be able to collectively introduce naphtha, distillate and gas oil products into the desulfurization unit without separating into each content having prescribed boiling range.

Accordingly, there is no evidence that one skilled in the art would be ***motivated*** to collectively introduce naphtha, distillate and gas oil products into the desulfurization unit without separating into each content having prescribed boiling range.

Moreover, Applicants respectfully submit that the method of Claim 1 is completely different from an old paradigm, e.g. the Figure of Boyer, in which a crude oil is first separated into multiple products, treated with reactions and then finished into respective products.

For example, the method of Claim 1 provides a new paradigm in which a step of refining is provided to common reactions, e.g., residue cracking and distillate hydro-processing, followed by separating into products. This new paradigm brings about a large cost reduction, for example, by including, among other things, a crude pre-separation having a single product stream for distillate, instead of multiple streams of the old paradigm of Boyer.

Applicants further note that the crude oil ***is not separated*** by distillation into several distillate oil fractions at a distillation section which includes a pre-separating apparatus and a vacuum distillation apparatus as a main separating apparatus. That is, the method of Claim 1 states that "the crude oil is separated by distillation into ***a*** distillate oil and ***a*** heavy oil content." The term "***a*** distillate oil" corresponds to a collective group product which contains a vacuum gas oil content, a gas oil content, a kerosene content and a naphtha content, ***without separating into each content having prescribed boiling range***. For example, the method of Claim 1 differs from Boyer in that the crude oil is separated by distillation into ***a*** distillate oil

and ***a*** heavy oil content, and the distillate oil separated in the distilling section contains a vacuum gas oil content, a gas oil content, a kerosene content and a naphtha content, and these contents are collectively introduced to a hydrotreating section ***without separating into each content having prescribed boiling range***.

It is noted that in rejecting a claim under 35 U.S.C. § 103(a), the USPTO must support its rejection by "substantial evidence" within the record,[1] and by "clear and particular" evidence[2] of a suggestion, teaching, or motivation to modify the teaching of a reference. As discussed above, there is no substantial evidence, nor clear and particular evidence, within the record of motivation for modifying the Friday's process by eliminating the solvent deasphalting, and for modifying the Boyer's process by collectively introducing the naphtha, distillate and gas oil products into a desulfurization unit without separating into each content having a prescribed boiling range. Without such motivation and absent improper hindsight reconstruction afforded by Applicants' invention,[3] one skilled in the art would not be motivated to perform the proposed modifications to Friday and Boyer. Accordingly, Claims 1 and 3-5 are believed to be non-obvious and patentable over Friday and Boyer, and the benefits obtained thereby are not obviated.

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[1] In re Gartside, 203 F3d 1305, 53 USPQ2d 1769 (Fed. Cir. 2000) (holding that, consistent with the Administrative Procedure Act at 5 USC 706(e), the CAFC reviews the Board's decisions based on factfindings, such as 35 U.S.C. § 103(a) rejections, using the 'substantial evidence' standard because these decisions are confined to the factual record compiled by the Board.)

[2] In re Dembiczak, 175 F3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) ("We have noted that evidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved, although 'the suggestion more often comes from the teachings of the pertinent references.' The range of sources available, however, does not diminish the requirement for actual evidence. That is, the showing must be clear and particular.") (emphasis added).

[3] See MPEP 2141, stating, as one of the tenets of patent law applying to 35 USC 103, that "[t]he references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention."

Consequently, in light of the above discussion, and in view of the present amendment, Applicants respectfully submit that the present application is in condition for allowance, and an early action favorable to that effect is earnestly solicited.

Respectfully submitted,

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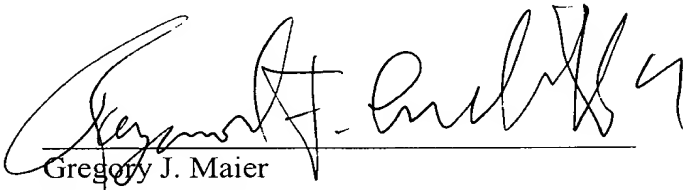

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